

TRANSPLANTATION OF URETERS FOR VESICO-VAGINAL FISTULA

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There is some difference of opinion about the usefulness and safety of uretero-colic anastomosis for the treatment of vesico-vaginal fistula. Mahfouz¹ maintained that very few patients live more than 3 years after such an operation. Most authorities, however, are agreed that the outlook for those treated for vesico-vaginal fistula and other non-malignant conditions is comparatively favourable.

In some instances the operation is nothing less than life-saving—for instance in a patient shown by Beloso² at La Sociedad de Cirugia del Uruguay, in whom endoscopic resection of the neck of the bladder, performed for retention of hysterical origin, had caused a fistula. Three attempts at repair per vaginam failed. The urethra had become a rigid tube, and the patient, after 2 years of chronic invalidism, was driven to the verge of suicide. Transplantation of the ureters was then carried out, with the result that within 17 days there was great general improvement, disappearance of the hypochondria, and well-controlled micturition. Satisfactory progress was maintained.

I have noticed an extraordinary improvement in the physical and mental state of African patients following this operation. They had all been admitted with the vagina in an extremely septic condition, and none of them regretted having undergone the operation; from being outcasts among their people they have been rendered socially acceptable.

Arthur Jacobs,³ in a survey of 1,673 uretero-colic anastomoses, stated that the postoperative mortality for traumatic conditions, the majority of which were vesico-vaginal fistulae, is the lowest for any of the classified conditions for which the ureters were transplanted into the colon. The expectation of life after the operation for vesico-vaginal fistula is second only to that for congenital anomalies.

These findings are in accordance with my experience in Nyasaland, where women whose ureters were transplanted several years previously by different surgeons have returned to hospital pregnant or seeking treatment for some other complaint. In one patient, upon whom a hysterectomy had to be performed for rupture of the uterus caused by obstructed labour, great anxiety was occasioned and operating time was wasted because the ureters could not be found in their normal position; they had been transplanted into the upper part of the sigmoid colon some years previously. The patient had stated that the abdominal scar found on examination was from a Caesarean section, and she had apparently forgotten the operation which she had undergone for transplantation of her ureters.

Another patient (case 5 described below) had been operated upon for transplantation of her ureters in 1954. She returned in 1960 complaining of incontinence, having continued to pass urine per vaginam for the intervening 6 years. At operation 2 more ureters were found which had been overlooked at the first operation.

THE OPERATION

Indications

Transplantation of the ureters from the bladder to the colon or upper rectum is indicated when a vesico-vaginal fistula is so extensive that local repair is impossible. It should also be considered when attempts at closure of the fistula would be unlikely to succeed on account of thickening and

rigidity of the walls of the fistula, vaginal stenosis, incontinence of the sphincter urethrae membranaceae, or urethral stenosis, and when attempts at suture have failed.

The question arises of how many attempts should be made to eliminate a vesico-vaginal fistula of moderate dimensions before resorting to uretero-colic implantation. Some women in Nyasaland have been subjected to several such attempts, and success has finally been achieved.

McCord,⁴ in his fascinating book *My Patients were Zulus*, described a Zulu woman upon whom he operated 7 times in attempts to repair a vesico-vaginal fistula. 'The seventh attempt at last sealed up the vaginal outlet, converting bladder and vagina into one sac—not the ideal solution, but at least affording her fair control over her discharges so that she would no longer be offensive in the kraal.' On being informed that his wife would be unable to bear more children, the patient's husband declared that he did not wish to have anything more to do with her!

Contraindications

1. The presence of an irreparable recto-vaginal fistula.
2. Pronounced loss of tone or incontinence of the anal sphincter. This can be rectified by a preliminary operation, but sufficient time must be allowed for the wound to become soundly healed before transplanting the ureters.

Pre-operative Investigation

Laboratory facilities here are limited, and there is no radiologist on the hospital staff. Examination is performed to determine:

1. The size of the vaginal outlet and the extent of infection;
2. the presence or absence of urethral stenosis;
3. the size and position of the fistula, and whether it involves the urethra;
4. the condition of the sphincter ani;
5. whether a recto-vaginal fistula is present;
6. the blood-urea level;
7. the condition of the kidneys and the number and size of the ureters by intravenous pyelography; and
8. by examination of the stool, whether intestinal bilharzia, hookworm, or other infection is present.

Permission is obtained, if possible, for performing salpingectomy in those likely to be endangered by further pregnancies. Most Nyasa women refuse such permission, for childbirth is considered by them and their husbands to be the most important reason for their existence, whatever its sufferings and dangers.

Pre-operative Treatment

Vaginal infection is treated for several days. The bowel is rendered as clean as possible by the administration of appropriate sulphonamides or antibiotics, and a urinary antiseptic is prescribed if the intravenous pyelogram shows evidence of pyelonephritis or ureteric thickening. A purgative is given 48 hours and an enema 24 hours before the morning of the operation. A low-residue diet is then prescribed and 1 or 2 colonic washouts are given on the day preceding the operation.

Technique

Coffey's technique⁵ has been fairly closely followed in 4

cases; other methods were used when for any reason Coffey's technique could not be employed. Simplicity, with reduction of operating time and therefore of shock, has been aimed at. The anaesthetic used has been open ether.

With the patient in Trendelenburg's position, and with an intravenous infusion instituted, a median subumbilical incision is made. The intestines are packed off and a self-retaining retractor is inserted. The right ureter is found and traced downwards as far as the broad ligament. It is divided there and the distal end is ligated. The left ureter is dealt with similarly. The right ureter is then dissected up towards the brim of the pelvis, until sufficient length is obtained for the anastomosis. The arteries seen to be supplying it are preserved, taking some of the peritoneum with the ureter if necessary. The lower end of the ureter is slit longitudinally for half an inch, and the short extremity transfixed distally with 00 chromic catgut with a straight needle at either end. The ureter is tied on both sides so that it is firmly grasped by the stitch. The end is wrapped in gauze and laid aside. The peritoneum is brought together in the place where the ureter lay.

The left ureter is dissected up similarly. When the length available is too short to allow it to be implanted below the pelvic mesocolon, it is first carefully freed below, then drawn upwards to a position above the mesocolon. This is done by thrusting the ends of a pair of long artery forceps through a small incision in the parietal peritoneum of the posterior abdominal wall above the mesocolon. The points of the forceps are passed downwards retroperitoneally, as suggested by Jidigan and Bickers,⁶ behind the root of the mesentery, care being taken to avoid damage to the inferior mesenteric vessels and their branches. The forceps grasp the end of the ureter, drawing it upwards so that it emerges above the mesocolon, where it is split distally, transfixed with a catgut stitch, secured on either side, and wrapped in gauze.

The ureters are now implanted into the colon through 2 separate incisions. On the right side the incision is made for about $\frac{3}{4}$ inch obliquely downwards and forwards through the peritoneal and muscular coats as far as the anterior taenia. The mucosa is defined, separated by blunt dissection, pulled upwards, and incised transversely at the lower end of the incision. The 2 straight needles carrying the ends of the catgut stitch fastened to the ureter are introduced separately into the lumen of the bowel through the small mucosal incision, and directed downwards and medially to a point 1 inch below the incision and about $\frac{1}{4}$ inch apart, where they are made to emerge through the bowel wall. Traction on these ends pulls the tip of the ureter neatly through the mucosal incision into the bowel. The ends are firmly tied, and the ureter is securely anchored. Failure to introduce the needles accurately low enough down the lumen of the bowel will allow urine to leak backwards into the peritoneal cavity.

Interrupted catgut stitches are used to close the sero-muscular incision, all but the lowest being made to pick up the wall of the ureter superficially. The anastomosis is covered, if possible, with a flap of peritoneum.

The left ureter is implanted into the bowel similarly. If this is done above the pelvic mesocolon, the pelvic colon is rotated over to the right to receive the ureter without strain and anchored by a catgut stitch, passed from an appendix epiploica to the psoas muscle or other convenient anchorage.

A wide rubber tube with side fenestrations is then passed

by the right hand into the rectum from below, the left hand being used in the abdomen to guide it up the bowel to the level of the upper anastomosis, as recommended by Hickey.⁷ In my experience this is a very important step, since free drainage of urine *via* a rectal tube greatly reduces the danger of leakage of urine into the peritoneal cavity. After removing gloves and recleansing the hands, the rectal tube is secured with nylon to the skin close to the anal sphincter. Rubber dam drains are introduced through the abdominal wound down to the anastomoses, and the abdomen is closed.

The advantages of implanting the left ureter low down into the recto-sigmoid rather than higher up above the mesocolon are that the path taken by the ureter is straighter, that it is easier afterwards to pass a rectal tube for drainage of urine right up to the level of the anastomosis, and that there is no need to immobilize the pelvic colon in an abnormal position. Should a sigmoidoscope be passed subsequently by a surgeon unaware of the fact that the direction of the pelvic colon has been altered, the instrument might possibly damage the colon or cause a drag on the ureter.

Postoperative Treatment

1. Intravenous fluids are administered until the patient is fit to take water freely by mouth, and gastric suction is instituted if necessary.

2. Water and glucose only are allowed until flatus has been passed, then a liquid diet is given until the rectal tube has been removed.

3. Aneurine hydrochloride, 250 mg. daily, is given subcutaneously for 4 days or until faeces and flatus are passed through the rectal tube.

4. An intestinal antiseptic, such as phthalylsulphathiazole, is continued for 1 week, and a urinary antiseptic is given as well if there is any likelihood of urinary infection.

5. The rubber dam abdominal drains are removed on the fourth day.

6. On the seventh day the rectal tube is removed, a mild purgative is administered if necessary, and the patient is allowed to get up.

CASE REPORTS

Case 1

Elizabeth, aged about 20 years, was admitted to hospital on 2 November 1959 with a vesico-vaginal fistula after the birth of a stillborn child following her first pregnancy. The vagina was contracted and there was a hard fibrous band on the posterior wall. First degree utero-vaginal prolapse was present. The urethra was impermeable. The pelvis was grossly contracted, but salpingectomy was refused.

Transplantation of the ureters was performed by Coffey's method on 17 November, but the ends of the ureters were pulled down only $\frac{1}{2}$ an inch into the bowel, and the sutures burying the ureters were introduced rather loosely for fear of constricting the lumen. A rectal catheter was passed, but it was not brought up to the level of the anastomosis. Two days later, much urine was leaking from the abdominal wound as well as through the rectal tube. The condition of the patient deteriorated, probably from peritoneal irritation following imperfect drainage. A second operation was therefore performed, and the anastomoses examined. The right was satisfactory, but urine was exuding through a small hole in the region of the left. Omentum was stitched over the leak, and a large drainage tube introduced. Three days later, paralytic ileus developed.

The flow of urine through the abdominal wound gradually ceased and all urine was passed per rectum. On 9 January 1960 an intravenous pyelogram showed that both ureters were functioning. The blood-urea level was satisfactory, and the patient had good control over both urine and faeces. She was discharged feeling well, with the wound healed.

Case 2

Nekelece, aged about 30 years, was admitted to hospital on 11 November 1959 with a fistula $1 \times 1\frac{1}{2}$ inches in size. The vaginal walls were extremely indurated and there was almost complete absence of the perineum. The anal sphincter, however, still retained some tone, and there was no incontinence of faeces. The usual preliminary treatment was given, including a course of stibophen for intestinal bilharziasis.

The ureters were transplanted on 15 December. Both were enlarged to the thickness of a little finger. They were divided and dissected upwards for about 2 inches, the intention being to transplant them by the method of Brendan Hickey,⁷ a modification of that of A. Davalos, in which a transverse incision is made across the anterior surface of the colon through the sero-muscular layers, and a half-moon of these layers dissected downwards, leaving the mucous membrane intact, which is then divided at the lower end of the half-moon. The mucous membrane was, however, intimately attached to the outer layers. Attempts to dissect down the half-moon caused buttonholing of the mucosa in 2 places. Long-standing bilharzial infection of the bowel had evidently caused adhesions of the mucous membrane to the muscular coat.

The ureters were therefore pulled down the colon with stitches for 1 inch, and the bowel closed round them as tightly as possible, securing the thickened outer coats of the ureters to the bowel wall. A large rubber tube was passed per rectum up to the level of the anastomoses, through which urine started to drain by the time the operation was completed.

An intravenous pyelogram on 6 January 1960 showed that both ureters were excreting well, and the patient was discharged symptomless the next day. She has returned twice for re-examination, when her condition was entirely satisfactory except that leakage of urine occurred from the rectum while she was asleep, probably on account of lack of the normal tone of the anal sphincter.

Case 3

Chembotole, aged about 28 years, was admitted to hospital on 12 December 1959 with a large fistula which had developed after the birth of a stillborn child following her first pregnancy 4 years previously. A band of scar tissue surrounded and narrowed the vaginal outlet. The anal sphincter was satisfactory. An intravenous pyelogram showed poor excretion of the right kidney, and the appearances suggested a double left ureter. After the usual preliminary treatment, the ureters were transplanted by Coffey's method on 5 January 1960. The pyelographic findings were misleading, for there proved to be only one ureter on the left side. The postoperative course was uncomplicated, and good control over micturition was established. The patient absconded from hospital on the 11th postoperative day.

Case 4

Ellen, aged about 27 years, was admitted to hospital on 27 January 1960 with incontinence of urine since November 1959, when she had given birth to a stillborn child, having been in labour for 3 days after her only pregnancy. Examination revealed stenosis of the vaginal outlet and a large communication between the bladder and the vagina. Intravenous pyelography showed good excretion down the left ureter in $\frac{1}{2}$ an hour and down the right in 1 hour. The ureters were transplanted by Coffey's method on 9 February. The convalescence was uncomplicated, and an intravenous pyelogram showed satisfactory excretion down both ureters 30 minutes after injection of the medium. The patient was discharged on 3 March.

Case 5

Grace, aged about 30 years, was admitted to hospital on 28 February 1960 with a history of incontinence since 1954 after the birth of a stillborn child, having been in labour for 4 days. The ureters were stated to have been transplanted 2 months after this, and a record of the operation was found in the register, but her incontinence had continued ever since.

A large fistula was found, admitting 2 fingers easily, with prolapse of the bladder wall into the vagina. A catheter introduced into the urethra was held up by an impassable stricture $\frac{1}{2}$ an inch from the meatus. The rectal sphincter was normal.

An intravenous pyelogram showed 4 ureters, but the shadows cast by the medium were not very clear. The blood urea was 60 mg. per 100 ml. The stool contained hookworms.

Operation revealed 1 ureter on the left and a very small ureter on the right still entering the bladder. Another ureter on the right side had been transplanted, and a structure which was thought to be a ureter on the left side was entering the pelvic colon. The untransplanted ureter on the left was divided as low down as possible, but it was not sufficiently long to reach the rectum. It was therefore inserted into the pelvic colon above the mesocolon. The minute extra ureter entering the bladder on the right was divided between ligatures, since it was too small to transplant. Recovery was satisfactory. Good control of micturition was established and there was no further leakage from the vagina.

Case 6

Mphangela, aged about 25 years, was admitted to hospital on 11 May 1960 with a history of incontinence for 1 year following childbirth. A fistula was present, for which an attempt at closure through an abdominal incision had been made at another hospital 4 months previously.

A catheter could be made to enter the bladder easily *via* the urethra. The fistula, about 4×3 inches, replaced almost the whole of the anterior wall of the vagina. The anal sphincter was fair. The vulva was excoriated by an eczematous condition. An intravenous pyelogram showed good excretion from the right kidney at 35 minutes; fair from the left kidney.

The ureters were transplanted by Coffey's method on 17 May. Progress was satisfactory until 1 June, when a small quantity of urine was observed leaking through the abdominal wound, and an intravenous pyelogram showed some leakage from the left ureter, but by 21 June the wound had healed. The patient was discharged free of symptoms.

Case 7

Mulimba, aged about 28 years, was admitted on 31 January 1960. Three weeks before admission she had given birth to a stillborn, full-term child. A large slough was seen partially closing the vagina, into which urine and faeces were discharging. A large fistula replaced most of the anterior wall of the vagina, and a circular recto-vaginal fistula, about $1\frac{1}{2}$ inches in diameter, could be felt $2\frac{1}{2}$ inches from the anus. The urethra was stenosed and the anal sphincter was lacking in tone. Two days later, the large foul-smelling slough was removed from the vagina.

It was hoped, after a preliminary colostomy, to repair the recto-vaginal fistula, and later to transplant the ureters into the pelvic colon. A right transverse colostomy was accordingly performed on 23 February. Later, the spur was divided, and the lower segment of the bowel irrigated.

Two attempts were made by a colleague, Dr Winifred Lochrie, to repair the recto-vaginal fistula, but healing was prevented by constant fouling of the wound with urine, even with the patient lying face downwards, for the vagina was greatly contracted—almost nonexistent in its upper part—and there was a profuse growth of granulation tissue. The anal sphincter was, however, successfully repaired at the first operation.

In view of the irritating effect of the constant flow of urine into the vagina, it was decided that further attempts to repair the rectum without first diverting the urinary stream would fail.

On 28 June, through a left lower rectus-split incision, a bilateral partial salpingectomy was performed, and an ileal ureterostomy effected by the method described by Pyrah and Raper.⁸ The continuity of the ileum was restored in front of the isolated ileal segment by side-to-side anastomosis. Difficulty was experienced in obtaining a water-tight junction between the thickened ureters and the isolated loop of ileum. After the anastomosis had been completed, and the distal end of the ileum brought out in the right iliac fossa, it was found that the urine did not drain externally, but was escaping into the peritoneal cavity. It was therefore necessary to shorten the ileal loop and perform a second, tighter anastomosis of both ureters. This was done in much the same way as in performing a uretero-colic anastomosis.

A Foley's catheter was used to drain urine from the ileal loop, but it became blocked repeatedly with blood clot and mucus. Greater success was attained with a de Pezzer catheter, but this also did not drain well unless slight traction was applied to it. Later, an ordinary rubber tube was employed, being held in position by passing it through a hole in a piece of corrugated rubber strapped to the abdominal wall. Fig. 1 shows the ureters after transplantation and the drain from the ileal bladder.



Fig. 1. Intravenous pyelogram of case 7 to show the outlines of the ureters after transplantation into an isolated loop of ileum. This X-ray was taken 55 minutes after injection of the opaque medium. The drain from the ileal bladder is also seen.

Paralytic ileus occurred after the operation, but recovery followed. The patient is being fitted with a Birkbeck appliance. On the advice of Professor Pyrah, no further operations will be undertaken for several months. It is hoped to repair the rectum, implant the ileal bladder into the pelvic colon, and close the colostomy, but these steps are being postponed until all possible inflammatory reaction in the region of the recto-vaginal fistula has completely subsided. The patient is now in good health. The blood urea is 60 mg. per 100 ml., but she has no cerebral, gastro-intestinal, or respiratory symptoms, is free from headaches, and does not suffer from thirst.

COMMENT

Only one of the patients (case 2) whose ureters were transplanted has returned for follow-up observation, so that details of the subsequent progress of the other patients cannot be given. This is inevitable, for most of those treated came

from places some distance away, and it is not usual for Africans to report once they think they are cured, unless complications develop. As far as is known there have been no deaths.

In conclusion, the following points are stressed:

1. The patient should receive sufficient fluids during the first few days after the operation. Parenteral administration of fluids may be necessary for more than 48 hours.
2. The passage of a rectal tube right up to the level of the anastomosis, if possible, greatly assists the free drainage of urine.
3. The possibility of the presence of more than 2 ureters must be borne in mind, even if these do not show on the intravenous pyelogram, since failure to transplant all the ureters will lead to a continuance of the passage of urine per vaginam.

SUMMARY

1. Some advantages of uretero-colic anastomosis in the treatment of vesico-vaginal fistula are quoted.
2. The indications and contraindications are summarized.
3. Suggestions are made for the pre-operative investigation and treatment, and postoperative care.
4. The technique of the operation, as practised by me, is described.
5. Reports are included on 7 consecutive patients. In one with a recto-vaginal fistula as well, an artificial bladder was constructed by isolating a segment of small intestine.

ADDENDUM

The report on case 7 (Mulimba) was not complete when this article was prepared. The following notes cover her progress up to April 1961. Mulimba was discharged in January 1961 wearing a Birkbeck appliance, which is a rubber bag connected to a shield secured with adhesive material to the abdominal wall. The urine flows into the bag, which is changed and washed out frequently. A colostomy bag and belt were worn in addition. The patient returned at intervals from January to April 1961 for inspection and any necessary renewal of parts of her equipment. When I last saw her, on my departure from Lilongwe in April, her condition was satisfactory and she had agreed to continue using the bags indefinitely. No further operation is contemplated.

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